

(2 pts. each, 20 total points)

1. Draw the structure of the following compounds:

a) *m*-chlorophenol



b) 4-ethoxy-1-butanol



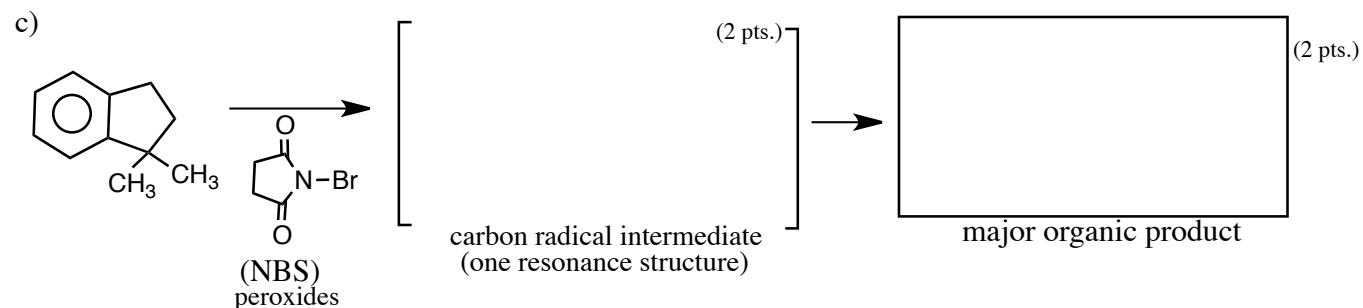
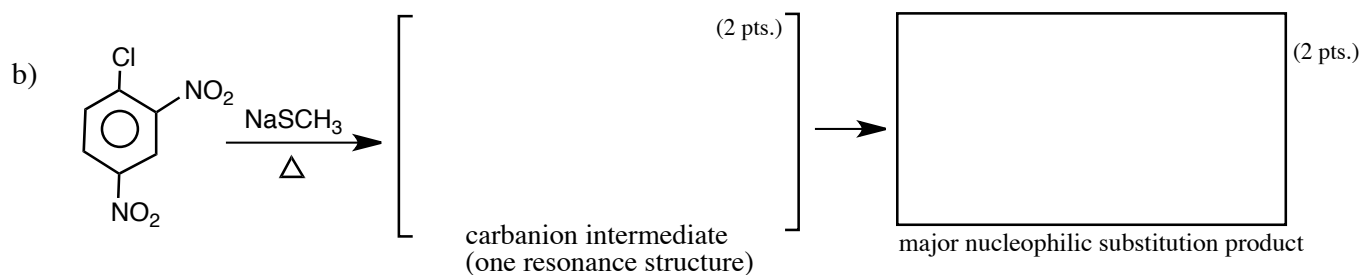
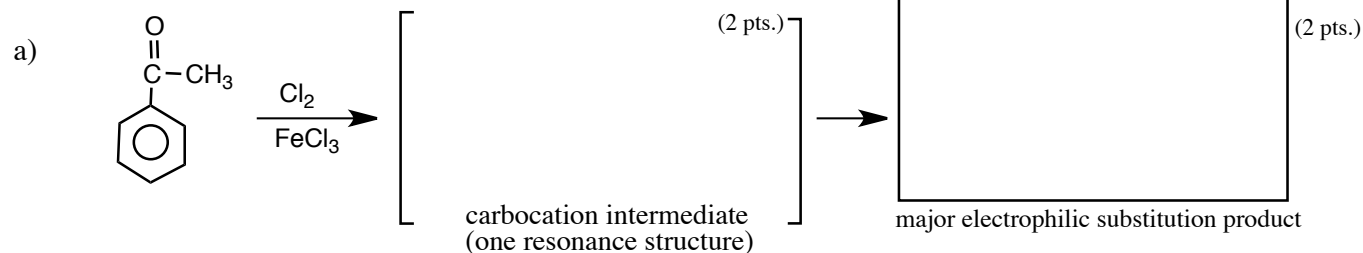
c) ethyl alcohol



d) methyl phenyl ether

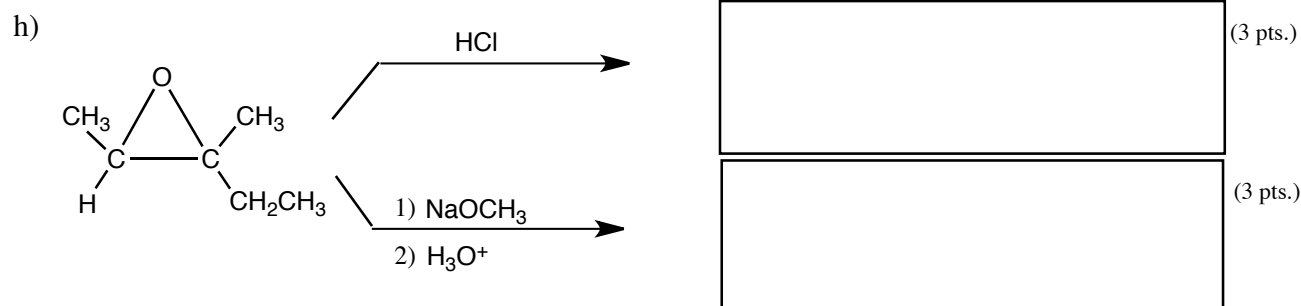
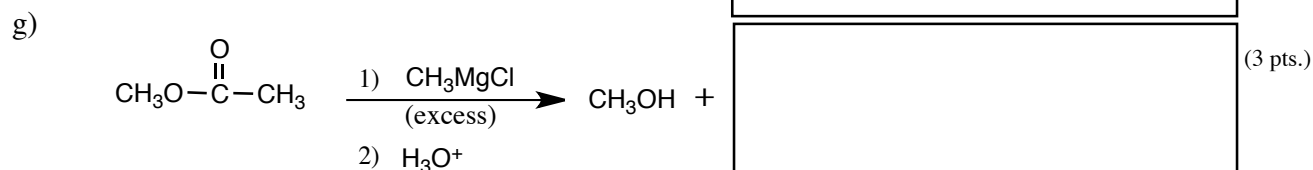
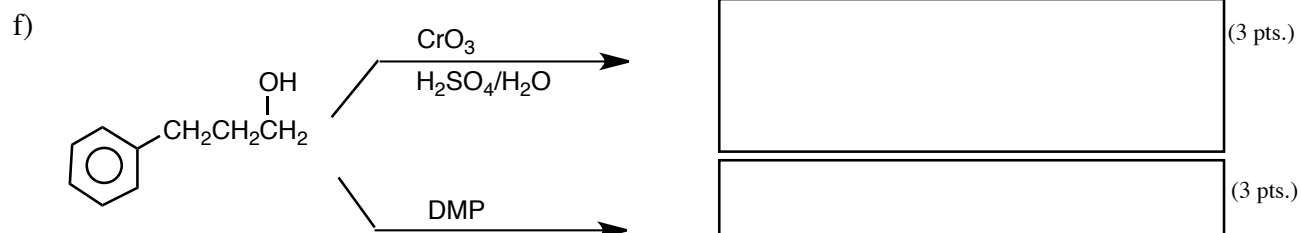
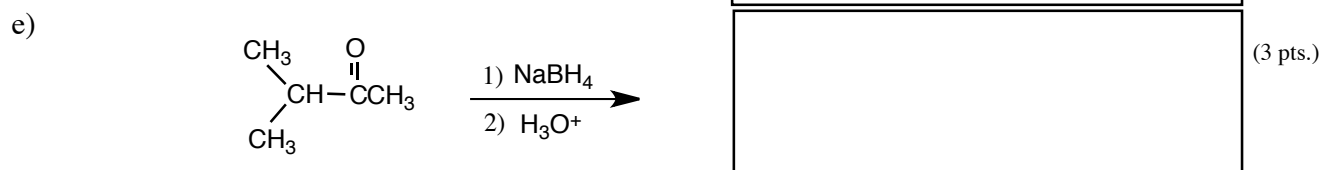
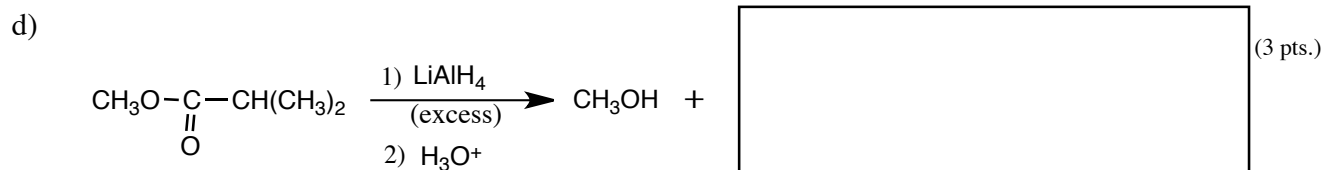
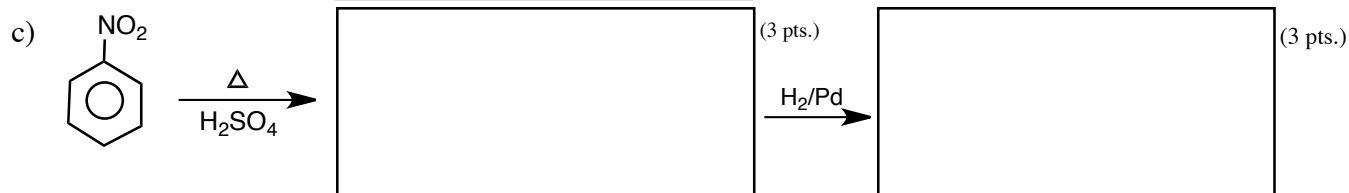
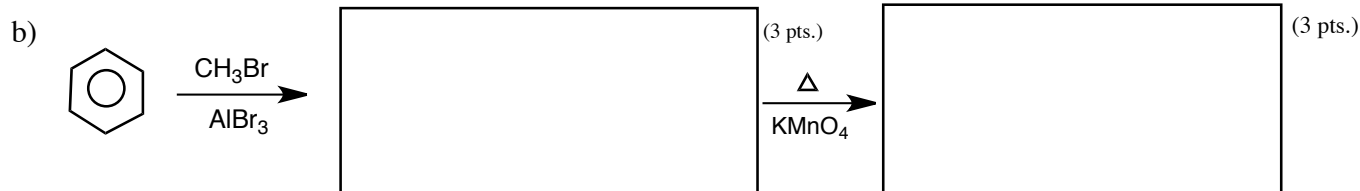


2. Draw an appropriate structure in each box:



(3 pts. each, 39 total points)

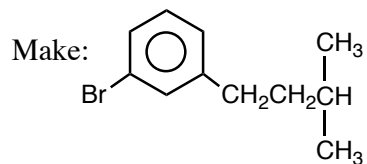
3. Draw the structure of the major organic product(s):




(12 points total)

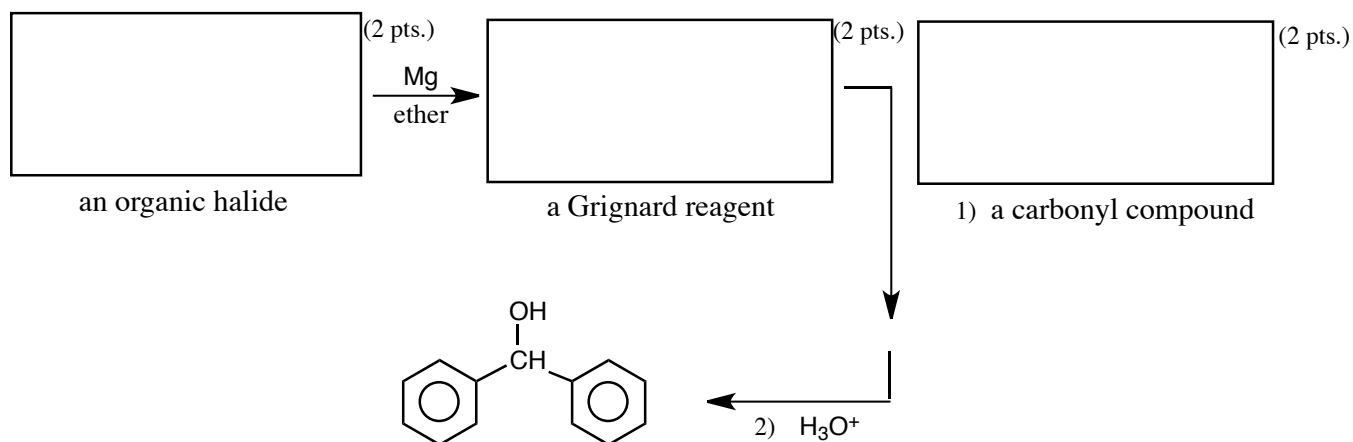
4. Outline the steps in an efficient synthesis:

(6 pts.)



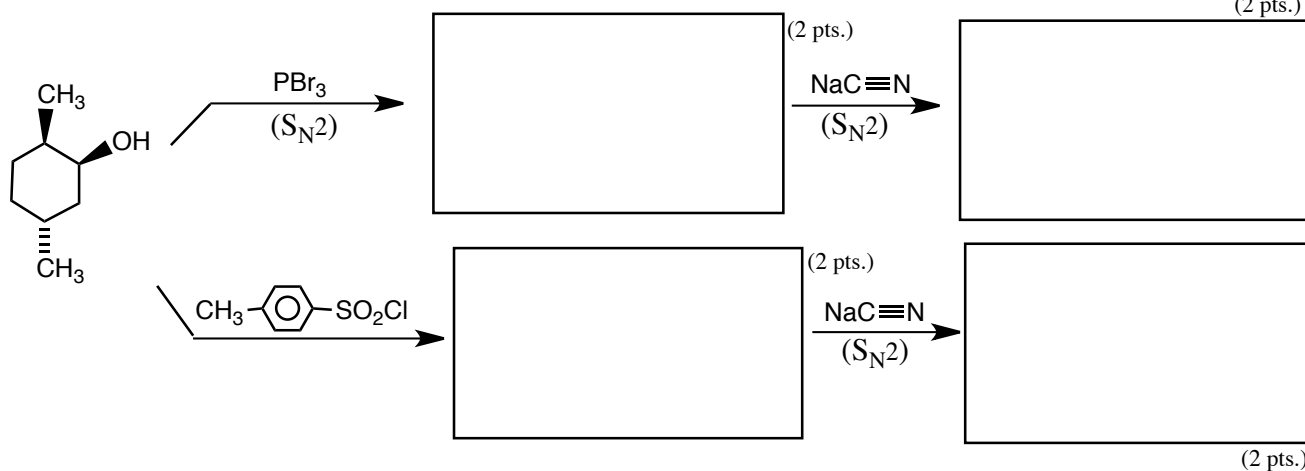
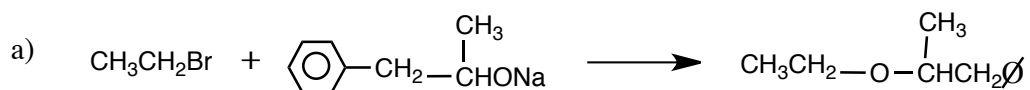
From:  and any other desired reagents

5. (6 pts. total) Fill in the boxes to complete the following Grignard Synthesis:

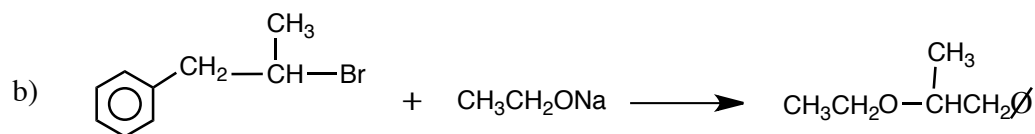


**(14 points total)**

6. Draw appropriate structures in the boxes. Show stereochemistry carefully.

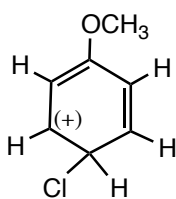
7. Encircle the Williamson ether synthesis (**a** or **b**) which will give the higher yield of the indicated product:

(2 pts.)

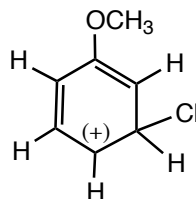


8.

a) Encircle the more stable carbocation:

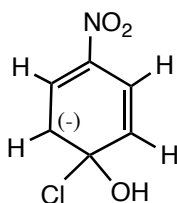


or

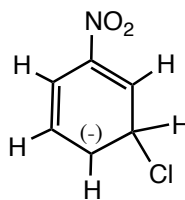


(2 pts.)

b) Encircle the more stable carbanion:



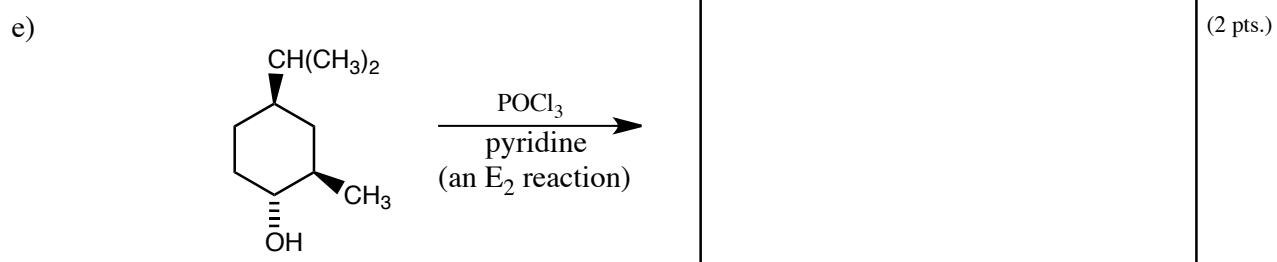
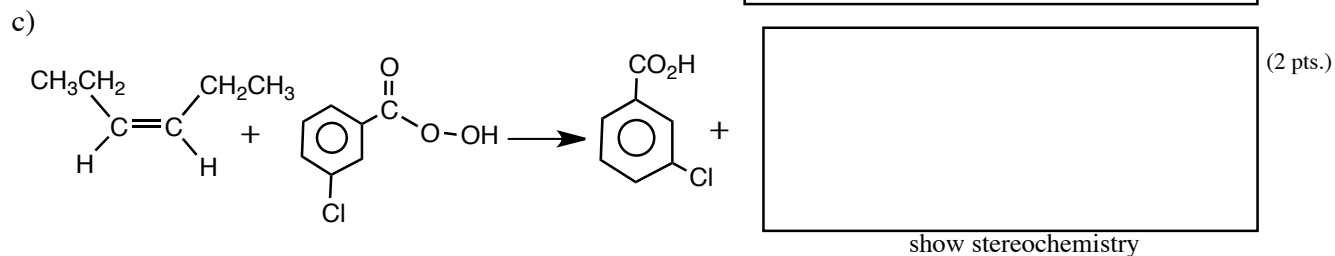
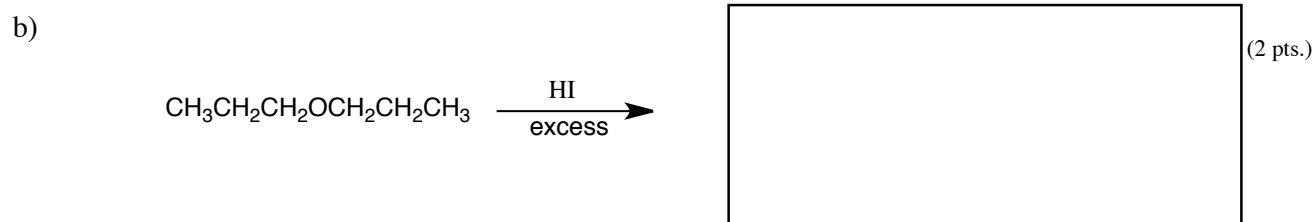
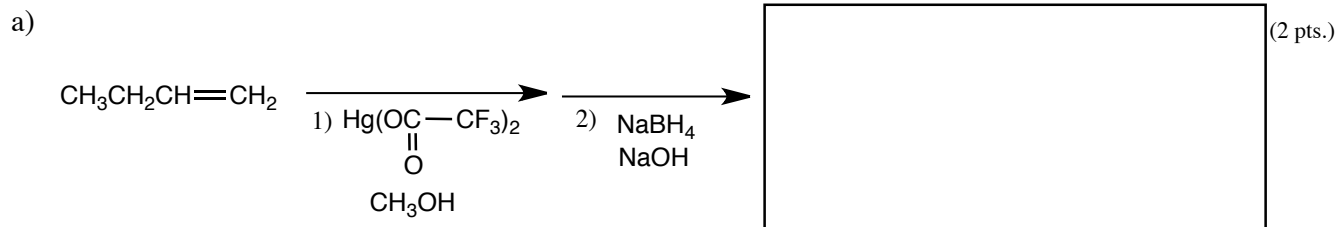
or



(2 pts.)

(15 total points)

9. Draw structures in the boxes to complete the following reactions:



10. Encircle the side favored at equilibrium for the following acid/base reaction:

